

2021

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Recommended Citation

Ceglio, Katherine and Stout, Julianne (2021) "Service-Learning in the Virtual Space: Mixed Method Analysis of STEPS Pipeline Program," *Purdue Journal of Service-Learning and International Engagement*. Vol. 8 : Iss. 1, Article 17.

DOI: 10.5703/1288284317420

Available at: <https://docs.lib.purdue.edu/pjsl/vol8/iss1/17>

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SERVICE-LEARNING IN THE VIRTUAL SPACE:

Mixed Methods Analysis of STEPS Pipeline Program

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STUDENT AUTHOR BIO SKETCH

Katie Ceglio is a current second-year medical student at the West Lafayette campus of Indiana University School of Medicine. She is a graduate of Purdue University, where she studied Mathematics and Spanish. During her undergraduate years, she participated in research in the special education department, conducting her own project on disability education in the medical field. She plans to focus her career in the field of developmental pediatrics.

BACKGROUND

Indiana faces a shortage of primary care providers (PCPs), ranking 38th in the United States with 127.2 PCPs per 100,000 residents (“Indiana Summary,” n.d.). Lack of access to quality health care influences the overall health of Indiana, leading to high rates of smoking, infant mortality, and obesity, among other indicators of health. Furthermore, this public health concern specifically affects many of the rural counties in Indiana. Thirty out of 92 counties in Indiana are designated Geographic Health Professional Shortage Areas because they have at least a 1:3,500 ratio of PCPs to residents (“HPSA Find,” n.d.).

The shortage of health care providers in rural areas is partially the result of the paucity of students from rural backgrounds who pursue health care professions. While medical schools have grown recently to address overall health care shortages, the growth has primarily consisted of students from urban areas who desire to practice in urban areas. In fact, over a recent period of 15 years, the number of rural students matriculating to medical school

steadily declined until rural students made up only 5% of all medical students (Shipman et al., 2019).

According to Kumar et al. (2015), there are a variety of factors that influence a rural student’s decision to enter health care. They identify three categories of factors: personal factors, like inherent interest in health; contextual factors, like educational opportunities in one’s own town; and experiential factors, like having a relationship with someone working in health care. Kumar et al. suggested that institutions should attempt to address all of these factors in developing pipeline programs.

Pipeline programs are programs designed to intervene somewhere along the educational pipeline, from grade school through graduate school, to encourage underrepresented or underserved students to pursue a future in health care (U.S. Department of Health and Human Services, 2009). These programs can play an important role in working to resolve shortages in health care providers, whether those shortages are of racial or ethnic minority providers or of rural providers. For the number of underrepresented health care students to increase,

institutional and educational disparities must be addressed with intentional programming efforts (Smith et al., 2009).

One common model of pipeline program involves providing support for undergraduate preprofessional students. In order to increase the number of rural providers, the number of rural students accepted into professional programs must increase (Wheat et al., 2007). Thus, programs that help undergraduate students overcome barriers to acceptance into graduate schools can have a direct, tangible impact on provider shortages. Knowing that adequate academic performance poses a barrier to acceptance for many students, Rackley et al. (2003) developed a program that offered supplementary academic courses for underserved students entering college. Pizur-Barnekow et al. (2010) identified other barriers, including financial need and lack of professional connections, and began to provide tuition assistance, mentors, and networking events for their undergraduate students.

Nationally, Area Health Education Centers (AHECs) exist with the mission of increasing access to and quality of health care for underserved or underrepresented populations (National AHEC Organization, 2018). Currently working in 85% of counties across the United States, local AHECs collaborate with academic centers and community organizations to provide pipeline programming for students and other trainings for health professionals and community members.

In Kentucky, the Northeast Kentucky AHEC works to address their local needs, including the significant lack of physicians in the predominantly rural northeastern region of the state. In 2013, they created the Successfully Training and Educating Pre-medical Students (STEPS) program, available to college juniors at a university attended by many students from the rural region. Preliminary studies showed an increase in the number of rural matriculants for each year of program implementation (Gross et al., 2016).

In light of rural health care shortages found in Indiana, North Central Indiana AHEC (NCI-AHEC) also aims to encourage rural students in their service district to pursue health care professions. Recognizing the initial success of the STEPS program run by the program in Kentucky, NCI-AHEC implemented a similar STEPS program at Indiana University–Kokomo (IU–Kokomo).

The STEPS program at IU–Kokomo, a mostly commuter school in the more rural area of north central Indiana, is

available for students interested in health care. In the fall of their junior year, students are recruited by AHEC and administrators to apply. In the spring, the program coordinates job shadowing experiences, mock interviews, and a tour of a medical school campus. Students' specific interests are considered when connecting participants with local health care professionals for shadowing, allowing them to experience primary care and specialty care in hospital and clinic settings. After the program began, an admissions test preparation aspect was added. Students who are accepted into the program are now given free access to an online Kaplan test prep course and Kaplan test prep books. In 2019, the program planned to add a community service aspect as well, but the implementation of community service was cancelled due to the COVID-19 pandemic.

After a few years of running STEPS at IU–Kokomo, AHEC sought program analysis. Published analyses of similar pipeline programs provided guidance in developing methods for evaluation. Some studies reported success by the number of students achieving the goal of acceptance to medical school (Gross et al., 2016), while others discussed qualitative feedback from students about the program through reflections or interviews (Anderson et al., 2005; Pizur-Barnekow et al., 2010). Pre/post surveys, in which students gave numerical responses to statements about their self-perceptions or opinions of the program, were commonly used (McLean et al., 2018; Pizur-Barnekow et al., 2010).

As a rising second-year medical student at Indiana University (IU) School of Medicine through Purdue University, I had the opportunity to do research during the summer of 2020. IU faculty connected me with AHEC for a collaborative study of their STEPS program. The goal of this study was to examine the impact that the STEPS program had on students who participated and to create recommendations to improve the effectiveness of the program.

METHODOLOGY

We used a mixed methods approach for the study of the STEPS program. The project was approved as an exempt study by the Purdue IRB. First, five years of quantitative data from yearly, online, retrospective pre/post design surveys were analyzed. Survey content directly addressed objectives set forth by AHEC. Of the 28 students who have participated in STEPS since it began at IU–Kokomo, 26 completed the survey. A coordinator at AHEC aggregated and de-identified the survey data from the 26 participants and shared it with the Purdue research

team. Dedoose software was then used to store and study the data. The small sample size precluded statistical analysis, but trends in the data were identified.

Next, a qualitative analysis was done of a semistructured interview conducted with one of the previous participants of STEPS. The interview was transcribed, and themes were identified by reading and annotating the transcription.

Following data acquisition, a Strengths, Weaknesses, Opportunities, and Threats analysis (SWOT) was performed based on the quantitative and qualitative data. Recommendations were then created based on this analysis.

COVID Impact on Methodology

As much of professional life as possible went virtual, to emails and video calls, during the pandemic. For Purdue researchers and for AHEC, this conveniently widened the constraints of a local community. Though part of the wider community of northern Indiana, students and researchers living in the urban college campus setting of Purdue don't always get opportunities to interact in person with the surrounding rural communities. With any expectations of in-person collaboration removed, the newfound ease of video meetings made a partnership seamless. All research meetings between the research team and with AHEC were conducted via Zoom, and all other correspondence took place over email.

RESULTS

Quantitative Analysis

Data for the seven AHEC goal statements, evaluated retrospectively from before and after participating in the STEPS program, are presented in Table 1. An eighth statement was given after participation: "This experience was helpful in exploring health careers." Twenty-two of the 26 responding participants, 84.6%, agreed or strongly agreed with this statement.

The number of students who agreed or strongly agreed increased from pre-STEPS to post-STEPS for every statement. This trend suggests that students found STEPS helpful in various aspects of their path to health care, including increasing their knowledge about health care careers and reassuring them about their plans to pursue further education for health care careers. The percentage of students who planned to pursue health care even before STEPS was relatively high, indicating that the program attracts students who are committed to health care. However, there was a large increase in agreement for the two statements addressing the knowledge required to pursue health care; STEPS served the role of giving students who were interested in health care the skills they needed to actually take steps to reach a health care career.

Closer examination of individual data points supports that idea that STEPS was also successful in convincing

Table 1. Survey Statements

| Survey Statements | % of participants responding "agree" or "strongly agree" BEFORE the program (% of 26 participants) | % of participants responding "agree" or "strongly agree" AFTER the program (% of 26 participants) |
|---|--|---|
| I know what education or training I need to have for a health care career | 38.5% | 92.3% |
| I think a health career would be a good fit for me | 76.9% | 96.2% |
| I have the information needed to pursue a health care career | 53.8% | 88.5% |
| I am prepared to continue my education or training after graduation | 61.5% | 96.2% |
| I plan to continue my education or training after graduation | 80.8% | 92.3% |
| I plan to become a health care worker | 80.8% | 92.3% |
| I plan to stay in Indiana after graduation | 38.5% | 61.5% |

Responses were collected with a Likert scale: 5 represented "strongly agree," 3 represented "not sure," and 1 represented "strongly disagree."

students to pursue health care who weren't previously convinced. There were three students who were "not sure" that they planned to become a health care professional before STEPS. After STEPS, all three students strongly agreed both that they planned to become a health care professional and that they planned to attend graduate school for health care. Furthermore, all five students who were "not sure" that health care was a good fit for them before STEPS then strongly agreed that health care was a good fit after the program.

The one statement that did not see high agreement after STEPS was about plans to stay in Indiana. This goal may be influenced by other factors, like students' family life or uncertainty about where future education may take place. Because part of the reason for the STEPS program, though, is addressing the rural health care shortage in Indiana specifically, this result highlights that some changes likely need to be made to the STEPS program to successfully address the shortage.

Qualitative Analysis

The previous participant who was interviewed for this study joined STEPS with the goal of pursuing either medical school or pharmacy school following graduation. She participated in various evening workshops put on by the STEPS program during her junior year. Through these workshops, her biggest takeaway was learning that she should volunteer or work in her desired health care field to confirm her interest in that line of work. She began working in the local emergency department, which made her confident in her choice to apply to medical school. Her dedication to pursuing medicine increased, then, throughout college. The more time she gave to preprofessional activities, including additional work in pharmacies and time volunteering to do research or mentor students, the more she felt committed to her choice.

I've come such a long way, I can't give up now. It's kind of like, okay, yeah, I want to give up, but I cannot. There's just too much that I've sacrificed to let that go to waste.

She motivated herself to follow through on achieving her goals by putting significant effort into those goals. The dedicated time has a professional benefit, as well.

I've done so much volunteering in hospitals, and working in hospitals, so I think it's about time I need to put it to use.

She learned a lot of medical knowledge and gained many relevant skills during her time working in the health care field. Now that she has that experience, she is more inspired to seek a profession where she can utilize her knowledge and skills to give back to her community.

Through academic experiences, she learned how to seek support when needed. While beginning to complete graduate school applications, she found the writing to be too overwhelming. Her small campus did not have sufficient academic writing assistance available, forcing her to lean on peers for help. She was able to find a friend to assist, but she acknowledged that she had peers who did not have the support-seeking skills she had.

A little push from some kind of organization or, like, a committee or program would be beneficial to students for them to kind of get that confidence to go and seek these opportunities.

Considering the nature of her campus, a smaller school with scarcer resources, she felt that there was great value in a program like STEPS, which could provide various supports to students who needed it. When asked about the other supports that STEPS provides, she reported that at the time, STEPS was unable to offer test prep materials to everyone as they do now. There were limited resources available, and she decided not to apply for them. She felt she did not have a chance of receiving them because she knew of another high-performing STEPS participant who she thought would likely be chosen. She also acknowledged that a structured, fast-paced course would not fit her more individualized study style. However, she felt that the supports from STEPS in setting up job shadowing and, in the future, community service were crucial for students who were unable to find those opportunities themselves.

The quantitative data support many of the themes expressed by the interviewee. Agreement with the statements addressing students' commitment to pursuing health care increased. Considering the interviewee's increased commitment to staying in the health care pipeline after working in the emergency department, other students' increased commitment could also be attributed to STEPS activities and opportunities. Furthermore, as students' preparedness for continued education increased with support for STEPS, so did the interviewee's readiness for graduate school increase with the support she sought throughout her education.

Creation of Recommendations

The SWOT table is detailed in Table 2. The Strengths and Opportunities alone indicate that the STEPS program currently is achieving many of its desired goals. Their workshops provide students with helpful advice and information. The job shadowing aspect places students in preprofessional activities. Relationships made through STEPS workshops, through shadowing or in other STEPS-organized activities can result in mentorship and support, which is important for all students navigating the health care pipeline. Mock interviews and admission test preparation on their own are also valuable resources for students. The STEPS program has plans to implement a required community service aspect, taking advantage of one of their largest opportunities to

increase student engagement in the community while honing students' skills.

The Weaknesses and Threats sections illuminate areas for growth for the STEPS program. As mentioned by the interviewee, limited resources, like funding insufficient to provide test preparation materials to a large cohort of students, will naturally create competition among students for those resources. At a small school where students are more likely to know each other, that competition may be more apparent. Furthermore, there are aspects of the prehealth professional process that STEPS currently does not address.

The Strengths of the STEPS program can be used to inform options for improving upon the Weaknesses and

Table 2. SWOT Table

| Strengths | Weaknesses |
|--|--|
| <ol style="list-style-type: none"> 1. Ability to provide useful advice for students, i.e., to get a job or volunteer position in the desired field to ensure it's a good fit 2. Connection to local health centers, which allows students to shadow; students gain experience, ensure they like the work, and increase their commitment to their goal 3. Mock interviews are very good practice for students 4. Kaplan MCAT test prep can be very successful for students 5. Implementation at a small school, where students know each other and can learn from and be encouraged by each other 6. Implementation in a smaller town, where students could hope to stay for future work | <ol style="list-style-type: none"> 1. Lack of sufficient resources for every pre-health student breeds unnecessary competition between applicants 2. Selection of applicants may be too heavily based on test scores, which excludes students who benefit from a more holistic review 3. A fast-paced test prep course, like what is offered, may not be the best option for learners, especially for those with a weaker science background 4. The program doesn't provide assistance with application writing, which students report needing help with |
| Opportunities | Threats |
| <ol style="list-style-type: none"> 1. Community service can help students develop skills like communication and empathy, as well as a foster a desire to give back to their community 2. AHEC can facilitate community service and community relationships that may have otherwise been unattainable 3. Mentorship found through the program may translate to future professional opportunities 4. STEPS participants themselves can serve as mentors to young students in the community, who may be encouraged to pursue health care careers in the future 5. Ability to fund high-quality test prep materials for students 6. Ability to provide non-medical school assistance, like GRE test prep | <ol style="list-style-type: none"> 1. Lack of sufficient funding to provide materials for all students to receive test prep materials 2. The small school environment may limit opportunities that would be recommended for pre-health students, including research 3. Students' personal motivation in the program may vary |

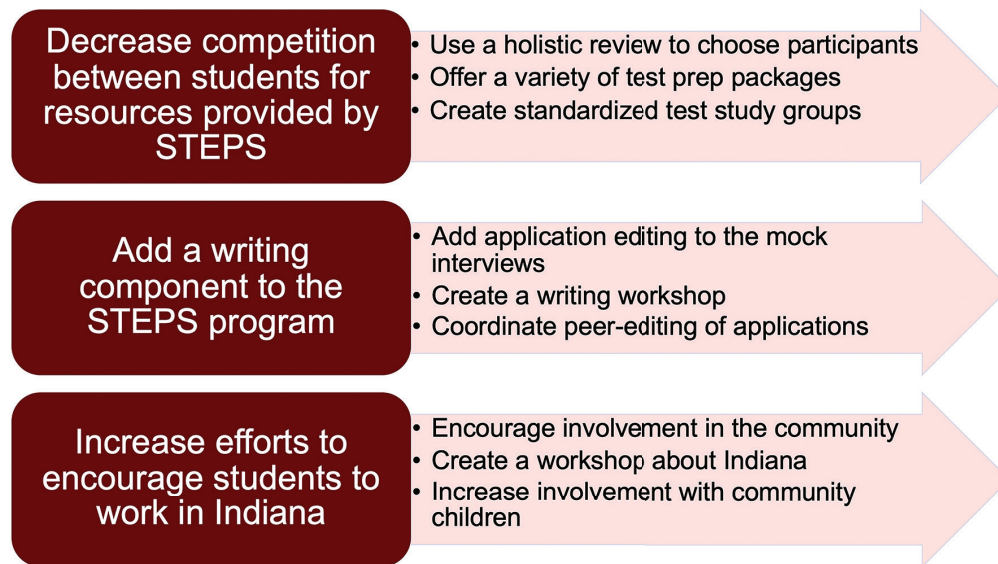


Figure 1. Recommendations for improvement.

Threats to the program. Three recommendations arise from this analysis and the quantitative data available and are seen in Figure 1.

COMMUNITY IMPACT: HOW STEPS EVALUATION BENEFITS THE RURAL HEALTH CARE COMMUNITY

Like many programs, STEPS was stopped once national shutdowns were in place. The time spent away from managing STEPS, however, provided AHEC with this window of opportunity for a thorough study of STEPS. By taking the time for program evaluation, NCI-AHEC is contributing to the success of all future students. Determination of the impact of the program on students so far illuminates deficits that otherwise might never have been noticed. If these deficits can be addressed through the provided recommendations, future cohorts of STEPS participants will be better supported and may be even more likely to become health care professionals.

AHEC demonstrated their commitment to the community by choosing to partner with a research university for their evaluation of STEPS. While AHEC brought the data and the motivation for the study, the team at Purdue was able to offer research experience and resources to build a robust study. Bias in finding areas for improvement was mitigated by working with external collaborators, and AHEC can trust that changes they make in the future will make STEPS a more evidence-based program.

This study also adds to the collective knowledge of pipeline programs that may be beneficial to students everywhere. Just as NCI-AHEC adopted the STEPS program from an AHEC organization in Kentucky, other AHECs around the country can learn from both the program itself and our evaluation results. If each implementation of a STEPS-like program is built on best practices, programs will be successful faster, and more students will be helped along their journey to health care.

STUDENT IMPACT

As a future health care provider myself, I am sincerely grateful for the opportunity I had to learn about the rural communities in Indiana. I, like most medical students, come from an urban background and perspective. I hope to practice in a somewhat specific subspecialty, one in which an urban office may serve an expansive, even statewide community of patients. To best treat patients of all backgrounds, I find it imperative to have some insight into the prides, joys, and challenges of others' lives. Listening to and learning from AHEC staff, prior STEPS participants, and comprehensive background research opened my eyes to health care within rural settings.

CONCLUSION

In order to address the shortage of health care providers in many rural communities around Indiana, universities throughout the state need to have successful pipeline programs that support rural students in accessing professional health care education. NCI-AHEC is doing this

work well, and with the actionable recommendations derived from this study, more progress can be made to minimize future shortages of health care providers.

Pipeline programs have been established as effective methods of increasing student enrollment in professional schools; yet shortages still exist, implying a need for iterative improvement of these programs. The current collaboration between NCI-AHEC and Purdue researchers creates a framework for continued collaboration and improvement. After implementation of the new recommendations, NCI-AHEC will have new data on student impact. Data review and analysis can be repeated, and recommendations can be refined in order to create the most effective version of STEPS. In return, the IU medical school at Purdue will have more diverse, well-rounded cohorts of students in the future.

The impact of publishing this project is twofold. First, we give direct suggestions to our local AHEC that can be used for their improvement as well as for spearheading improvement of similar pipeline programs around the country. The body of knowledge regarding health care pipelines becomes more robust and widely applicable. Second, we demonstrate that, despite delays and challenges in programming due to the COVID-19 pandemic, it is always possible to utilize virtual opportunities for collaboration to look at what works and what doesn't within community organizations. The more organizations that strive to do the best they can, the better those communities will be.

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ACKNOWLEDGMENTS

We would like to thank Emerald Blankenship for the time she dedicated to this study, as well as Jeremy Ashcraft, director of NCI-AHEC, for the support he gave this project. I would also like to thank Dr. Stout for assisting me in every step of this scholarly project.

Ceglio, K. & Stout, J. (2021). Service Learning in the Virtual Space: Mixed Methods Analysis of STEPS Pipeline Program. *Purdue Journal of Service-Learning and International Engagement*, 8, 113–119. <https://doi.org/10.5703/1288284317420>